JS Army Corps
of Engineers
North Central Division

GREAT LAKES LEVELS

Update Letter No. 96 June 1, 1993

Great Lakes - St. Lawrence River Water Levels Reference Study Board Recommendations

After 2-1/2 years of intense study activity and public involvement, the Levels Reference Study Board has presented its final report to the International Joint Commission.

The report concludes that the installation costs of major engineering works to further regulate the levels and flows of the Great Lakes and St. Lawrence River would exceed the benefits provided. In addition, these works would have negative environmental impacts. The report recommends comprehensive and coordinated land use and shoreline management programs throughout the basin to help reduce vulnerability to flood and erosion damages. (Figure 1).

Regardless of whether lake levels and flows are regulated, damage to shoreline properties, public infrastructure and water dependent businesses will continue without land-based action to curb such damage.

Coordinated land use and shoreline management programs need to be instituted at the local level to take into account the needs of those affected.

While the Study Board recognizes that it may be impossible to implement such programs uniformly throughout the basin, the recommendations aim at uniformity to the maximum

Figure 1. Great Lakes - St. Lawrence River Basin

extent possible. This would help ensure consistency in the application of these measures. The Board recommends that Governments budget $10 to $20 million annually for these purposes to be shared equally by Federal, State and local Governments.

In addition to long-term planning, the Study Board urges Governments to begin as soon as possible developing coordinated and comprehensive Emergency Preparedness Planning.

Two of the Great Lakes (Superior and Ontario) already have structures at their outlets that control outflows. The report recommends improvements to make the existing regulation plans more responsive to the current needs of the interested parties.

The report also recommends removal of some fills in the Niagara River, which over the years, have impeded the river's outflows and slightly raised the level of Lake Erie. The removal of fills would lower Lake Erie's long-term average level by 0.03 to 0.06 meter (0.1 to 0.2 foot). Action is recommended to prevent future fills in the connecting channels that could have similar effects upon lake levels.

Management of problems associated with fluctuating water levels does not appear to be guided by clear or consistent policies among government agencies. The Study Board recommends all levels of government adopt principles to guide future decisions and enhance coordinated, system-wide management. The same principles were used to guide the study.

The Levels Reference Study relied extensively on citizen input, through its 18-member Citizens Advisory Committee, citizen membership on its working committees, open proceedings, its newsletter, and through 17 public events around the Great Lakes-St. Lawrence River Basin in the final phase of the Study. This process convinced the Board that future resolution of water level issues will depend, not only upon coordination and cooperation, but upon the continued involvement of the people who are most directly affected.

The Board recommends establishing a Great Lakes-St. Lawrence River Advisory Board, with citizen and agency representation, to advise the Commission and to coordinate responses to water level issues. Another recommendation calls for increased citizen membership on the International Lake Superior and St. Lawrence River Boards of Control.

The study looked at both high and low water levels. The potential lowering effects of climate change on the Great Lakes and St. Lawrence River could be dramatic. The Board recommends that these possible effects be taken into account in future management of water levels and flows.

The Study also identified areas in which data gathering efforts, information storage, interpretation, and communication could be improved. A number of actions are recommended to update hydrologic and hydraulic models, improve forecasting and statistical methodologies, improve communication of water level and flow information, and improve data collection - including monitoring of shoreline flooding and erosion and mapping of hazard areas.

Recommendations for Action Guiding Principles

1. The Board recommends that federal, state and provincial governments adopt the following eleven Guiding Principles for the management of water levels and flows in the Great Lakes - St. Lawrence River System.

a. Existing and future beneficial uses will be considered, and the fundamental character of the Great Lakes-St. Lawrence River System will not be adversely affected.

b. Actions approved or taken will be environmentally sustainable and respect the integrity of the ecosystem.

c. Actions approved or taken will be beneficial and not result in undue hardship to any particular group.

d. Coordinated management needs to respect and accommodate the dynamic nature of the entire Great Lakes-St. Lawrence River System.

e. Reduction of damages to existing development from fluctuating water levels needs to be based on the use of both non-structural and structural measures.

f. Prevention of damages to future development will include the implementation of land use measures that discourage construction in areas subject to damage from fluctuating water levels and storms.

g. Management of the System will take full awareness of the potential for reduced water supply as a result of climate change.

h. Decision-making will be open, respecting the full range of interests affected by any decisions, and facilitating their participation in the policy process.

i. Management of the System will be based on coordination of actions relating to levels and flows.

j. Management of the System will be based on continued improvement in the collection of data and the understanding of the processes and impacts of fluctuating water levels and flows.

k. Management of theSystem requires ongoing communications and public awareness.

Measures - Lake Level Regulation

2. The Board recommends that Governments give no further consideration to five-lake regulation.

3. The Board recommends that Governments give no further consideration to three-lake regulation.

4. The Board recommends that the regulation plans of Lakes Superior and Ontario be modified to achieve water levels and flows similar to those described in Measure 1.21 (in the Final Report).

5. The Board recommends that the Orders of Approval for the Regulation of Lake Superior be reviewed to determine if the current criteria are consistent with the current uses and needs of the users and interests of the System.

6. The Board recommends that the International Lake Superior Board of Control be authorized to use its discretion in regulating the outflows from Lake Superior, subject to conditions.

7. The Board recommends that the criteria of the Orders of Approval for Lake Ontario Regulation be revised to better reflect the current needs of the users and interests.

8. The Board recommends that the Orders of Approval for Lake Ontario Regulation be modified to reflect the interests of recreational boaters and the environment on Lake Ontario and the St. Lawrence River.

9. The Board recommends the initiation of negotiations to remove fills upstream of the International Railway Bridge on the Niagara River to lower the mean level of Lake Erie by 0.03 to 0.06 meter (0.1 to 0.2 foot).

10. The Board recommends that first priority for fill removal be Nicholl's Marine.

Measures - Land Use and Shoreline Management

11. The Board recommends that any comprehensive approach to management of the adverse impacts of fluctuating water levels and flows should be multi-objective in focus and coordinated in application.

12. The Board recommends that consideration be given to establishing multi-level government funding of $10 to $20 million per year, to plan and implement land use and shoreline management projects.

13. The Board recommends that areas requiring land use and shoreline management measures be prioritized through a comprehensive shoreline management program in developed and undeveloped areas.

14. The Board recommends that consideration be given to implementing remedial measures when appropriate to the local conditions. The following are recommended for implementation, as appropriate: relocation of structures from hazard areas; flood proofing of existing structures; non-structural shore protection; and, structural shore protection, where other alternatives are not appropriate, but only if well designed and engineered, and impacts are not shifted to adjacent areas.

15. The Board recommends that the following preventive land use and shoreline management measures be implemented and applied consistently and uniformly:

a. Erosion setbacks that include minimum requirements of a 30-year erosion zone for movable structures and a 60 to 100-year erosion zone for permanent structures, plus an adequate distance to assure a stable slope.

b. Flood setbacks and elevation requirements that include minimum requirements for a 1% flood risk line plus allowance for wave uprush and freeboard.

c. Shoreline alteration requirements established in the context of a comprehensive plan.

d. Regulations in Canada to control fills and other obstructions in connecting channels.

e. Real estate disclosure requirements that the property is within a mapped or known flood or erosion hazard area.

f. The buyer should sign an acknowledgment of being informed of the risk.

16. The Board recommends that acquisition of land and habitat protection areas be considered in areas where it is appropriate.

17. The Board recommends that, where hazard insurance exists or is implemented in the future, the following elements be included:

a. It should use historic shoreline change methods coupled with recession rate studies.

b. It should encourage community-based erosion management by establishing setbacks for new construction.

c. It should deny subsidized insurance for new or substantially improved construction within the hazard zone and should require that any structure substantially damaged during a storm be reconstructed landward of the hazard zone.

d. It should provide eligibility for mitigation assistance when the aggregate of damage claims exceed 50% of the fair market value of the insured property.

Emergency Preparedness

18. The Board recommends that the two federal governments, in cooperation with provincial and state governments, begin preparing a joint and cooperative Emergency Operations Plan for the Great Lakes-St. Lawrence River as soon as possible.

19. The Board recommends as a priority that investigations continue into methods of alleviating high or low water crises on the lower St. Lawrence River; and, further, that investigations continue into avoiding increased damages as a result of crises actions taken upstream.

20. The Board recommends that the following be implemented in the near future:

a. The authority necessary to deviate from the Lake Superior and Lake Ontario Regulation plans during an emergency.

b. The installation of an ice boom at the head of the St. Clair River to reduce the risk of ice jams and flooding.

c. Increasing the flow capacity of the Black Rock Lock, to allow an additional 340 cms (12,000 cfs) during emergency situations.

d. Changing management of the major Great Lakes diversions (Long Lac, Ogoki, Lake Michigan at Chicago, and Welland Canal) during crises situations when conditions permit.

21. The Board recommends that prior to implementing changes in diversion management that the potential impacts within and outside the System be determined.

22. The Board recommends post crises action reports to evaluate the effectiveness of emergency preparedness plans and to recommend areas for improvement.

23. The Board recommends that comprehensive emergency preparedness planning be undertaken immediately at the provincial, state and local government levels. This should include public information programs, stockpiling of emergency materials, monitoring of water levels and flows, and identification of areas where community-based shore protection can be implemented immediately.

Institutions

24. The Board recommends that the Lake Superior Board of Control be expanded to include representation from citizens, the states, and provinces.

25. The Board recommends that the International St. Lawrence River Board of Control be expanded to include citizen representation from Lake Ontario, the upper St. Lawrence River, and the lower St. Lawrence River.

26. The Board recommends that a Great Lakes-St. Lawrence River Advisory Board be created to coordinate, review, and provide assistance to the Commission on issues relating to the water levels and flows of the system.

Communications

28. The Board recommends that a Great Lakes-St. Lawrence Water Level Communications Clearinghouse be established with the responsibility to: communicate with the public; facilitate communication between the public and governments; and, facilitate coordination of agency communication activities related to the water levels and flows of the System.

29. The Board recommends that a clearinghouse be established under major federal agencies such as Environment Canada and the U.S. Army Corps of Engineers and that it be linked to larger units within these agencies that can act as information resources and provide staff support in water level crises periods.

30. The Board recommends that the Clearinghouse establish and coordinate a network of agencies and groups that communicate about water level issues.

Management and Operational Improvements

31. The Board recommends the following actions be taken to improve the information base used to manage the Great Lakes-St. Lawrence River resource:

a. Identified deficiencies in the precipitation and snowpack network be remedied.

b. A risk analysis model be developed for Lake Ontario that accounts for the uncertainties of water supply, storm surge, variations of tributary inflows downstream of Cornwall, and updated stage-damage data in the Lake Ontario-St. Lawrence River system. This model would assist in equitably managing outflows during high and low-water supply periods. If discretionary authority is provided to the Lake Superior Board of Control, as recommended, this type of model should be implemented for Lake Superior.

c. Efforts be made to improve long-range precipitation and temperature forecasts.

d. New technologies, such as satellite and airborne sensors and ground-based radar, be developed to monitor lake evaporation, overlake precipitation, and basin-wide snow conditions.

e. Work continue to upgrade models used for simulation, forecasting and regulation to formulate a comprehensive water supply and routing model that includes the whole basin through Trois Rivieres, Quebec.

f. Efforts continue to improve the forecasting and statistical information utilized to make decisions, and that this be coupled with upgraded system-wide supply and routing model.

g. Efforts to improve communication be implemented.

32. Efforts should be initiated and continued to standardize hazard mapping methodologies across the system.

33. Procedures should be developed to allow broad access to such maps for general use.

34. Long term monitoring of shoreline erosion and bluff recession should be undertaken, and future erosion damage assessments consider or be based on information and methodologies developed under this study.

35. The U.S. and Canadian land use mapping systems should be updated on a periodic basis and be designed and developed cooperatively to promote uniformity.

36. A potential damage survey should be undertaken to improve flood damage estimates.

37. First priority for the potential damage survey should be given to Lake Ontario and the St. Lawrence River.

38. A comprehensive wetlands inventory should be completed and long term assessments of the effects on wetlands of variations in levels and flows be continued.

39. Refinement of Global Climate Models should be continued to improve their predictive capability and use as a planning tool.

40. Efforts should continue to develop a bi-national assessment of the potential impacts of climate change on the System and to coordinate a response to the expected climate effects.

41. The Board recommends that the following data elements be incorporated into Geographic Information Systems databases:

a. All land use information for the entire shoreline.

b. All hazard areas along the Great Lakes-St. Lawrence River.

c. All coastal wetlands.

42. The Board recommends that cooperative bi-national coordination and planning of Geographic Information System development and use be considered to increase its usability relating to the System, and that national and international standards for data transfer be established.

The substance of this Update Letter was taken from Update #8 of the Levels Reference Study. Contact the following for copies or other questions:

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Lake Ontario Outflows

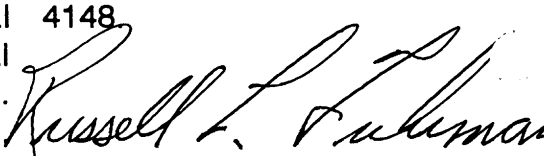
Beginning on May 20, the International St. Lawrence River Board of Control began a program to dramatically increase Lake Ontario's outflow. This is being taken to help reduce Lake Ontario's critically high levels more quickly. The outflows are being increased to 385,000 cfs, two days a week. During these high flows, navigation in a portion of the St. Lawrence River is being delayed. Additional details will be provided in next month's Update Letter.

On a personal note, this is my last Update Letter as I am being reassigned to Germany. I have thoroughly enjoyed this important forum providing you, our readers,

with information you need to know.

Seminar Announcement

The Corps and USEPA are sponsoring a seminar on dredged material assessment and management in Ann Arbor, Michigan on July 20-22, 1993. At this seminar, a new national manual for dredged material testing will be introduced. Persons involved in managing, testing, evaluating, or regulating dredged material are encouraged to attend. To get more information and to register for the seminar, call Mr. Larry Bird at (601) 634-4148.



Russell L. Fuhrman
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Great Lakes Basin Hydrology

In May, both the water supply and precipitation to Lake Superior were both above average. On Lakes Michigan-Huron, whereas the precipitation was above average, the water supply was below. The opposite was true on Lake Ontario, it receiving an above average water supply at a time precipitation was below average. The May precipitation and water supply to Lake Erie were both below average. As a result, the water levels on Lakes Superior and Ontario were slightly higher than predicted last month, while the remainder of the lakes were slightly lower. As compared to long-term averages (1900-1992), the level of Lake Superior is about average, while Lakes Michigan-Huron, St. Clair, Erie and Ontario are 6, 12, 16 and 24 inches respectively above average. Based upon the above information, shoreline residents of Lakes St. Clair, Erie and Ontario should continue to be aware of storms and other adverse hydrologic conditions as they may affect their property. Further information and advice will be provided by the Corps of Engineers should conditions worsen.

The precipitation, water supplies, and outflows for the lakes are provided in Table 1. Precipitation data include the provisional values for the past month and the year-to-date and long-term averages. The provisional and long-term average water supplies and outflows are also shown.

Table 1
Great Lakes Hydrology[1]

PRECIPITATION (INCHES)								
BASIN	MAY				YEAR-TO-DATE			
	1993[6]	AVG.[7]	DIFF.	% OF AVG.	1993[6]	AVG.[7]	DIFF.	% OF AVG.
Superior	4.1	2.7	1.4	152	10.2	9.8	0.4	104
Michigan-Huron	3.4	3.0	0.4	113	11.9	11.5	0.4	103
Erie	1.6	3.3	-1.7	48	13.9	13.7	0.2	101
Ontario	2.1	3.1	-1.0	68	14.4	13.6	0.8	106
Great Lakes	3.2	3.0	0.2	107	12.0	11.6	0.4	103

LAKE	MAY WATER SUPPLIES[8]		MAY OUTFLOW[3]	
	1993[2]	AVG.[4]	1993[2]	AVG.[4]
Superior	227,000	186,000	77,000	75,000
Michigan-Huron	229,000	251,000	192,000[5]	189,000
Erie	27,000	46,000	245,000[5]	213,000
Ontario	74,000	60,000	355,000	257,000

[1]Values (excluding averages) are based on preliminary computations.
[2]Cubic Feet Per Second (cfs)
[3]Does not include diversions
[4]1900-89 Average (cfs)
[5]Reflects effects of ice/weed retardation in the connecting channels.
[6]Estimated
[7]1900-91 Average
[8]Negative water supply denotes evaporation from lake exceeded runoff from local basin.

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